Geometrical development of analytical ideas: Professor L. C. Karpinski, University of Michigan.

The anharmonic ratio in projective geometry: Professor E. B. Stouffer, University of Kansas.

The association's ideal for expository papers: Professor E. J. Wilczynski. (Introductory Note.)

The first work on mathematics printed in the new world: Professor David Eugene Smith, Columbia University.

Rolle's theorem and its generalizations: Professor A. J. Kempner, University of Illinois.

Some geometrical aspects of the theory of relativity: Professor L. W. Dowling, University of Wisconsin.

Note on "the metric question from the historical standpoint": Professor L. C. Karpinski, University of Michigan.

General aspects of the problem of interpolation: Professor Dunham Jackson, University of Minnesota.

Construction of double entry tables: Professor A. A. Bennett, in charge of the U. S. Ordnance Ballistic Station, Baltimore, Md.

Certain general properties of functions: Professor Henry Blumberg, University of Illinois.

In addition to the election of Professor G. A. Miller as president of the Mathematical Association of America, the following elections were made:

For Vice-president: R. C. Archibald, Brown University; R. D. Carmichael, University of Illinois.

For Members of the Board of Trustees: A. A. Bennett, U. S. Ordnance Ballistic Station; Florian Cajori, University of California; H. L. Rietz, University of Iowa; D. E. Smith, Columbia University; C. F. Gummer, Queen's University.

Seventy-two individuals and three institutions were elected to membership and a Texas Section of the association was approved.

Wm. H. Roever,
Secretary, Section A;

Arnold Dresden,
Secretary, American Mathematical Society, Chicago Section;

W. D. Cairns,
Secretary, Mathematical Association of America

THE AMERICAN SOCIETY OF AGRONOMY

The winter meeting of the society was held at Chicago in affiliation with the American Association for the Advancement of Science, on Friday, December 31.

The program follows:

SYMPOSIUM

Our Present Knowledge of Methods of Corn Breeding

Leader: H. K. Hayes, University of Minnesota, St. Paul, Minn.

The experimental basis for the present status of corn breeding: F. D. Richey. A review of experimental efforts to increase corn yields by breeding points to the following conclusions: (1) Mass selection on the basis of production of mature, sound grain per plant, under conditions of uniform stand and fertility, may be recommended as a means of at least maintaining yields. (2) There is no evidence that ear-to-row breeding can be relied upon to obtain increased yields commensurate with the cost. (3) First generation varietal crosses, and crosses or double crosses between pure lines, offer possibilities for obtaining larger yields; but the value of each combination must be determined experimentally. (4) The evidence as a whole shows clearly the value of selection in obtaining better adaptation to a specific environment and the value of hybrid vigor in obtaining larger yields. These principles, in connection with the Mendelian interpretation of heterosis as due to linked dominant growth factors, point to selection, hybridization, and further selection, all based on pure lines and controlled pollination, as the only sound basis for real corn improvement.

The bearing of modern genetic studies on corn breeding: R. A. Emerson.

Corn breeding as a hobby: H. A. Wallace. Eight rather late corn varieties were combined as pollinating parents with each of twenty rather early mother parents. Of these 160 combinations, 50 were tried out in comparison with the Iowa Station strain of Reids at Ames and the others were tried out at Des Moines. At both places a strain of Reids known as Iowa 10 proved to be the best of the eight as a pollinating parent and a Kentucky strain of Johnson Co. White proved to be poorest. During 1916, 1917, 1918 and 1919, the Iowa Station has tried out 287 hybrids and of these only 50 have outyielded the station strain of Reids. There is probably about one chance in one hundred of finding a cross of two distinct varieties which will prove to be an improvement on the best of the varieties now in use. The most promising cross so far discovered in Iowa is a cross of the Iowa Station strain of Reids with Argentine corn.

The author believes that there must eventually be special purpose corns such as 90-day corns, silage corns, etc., as well as standard grain vari-

eties. He advocates as an aid to specialized corn breeding the formation of a Corn Record Association for the registration of promising selfed strains. By proper encouragement, he believes that retired farmers could be interested in the development of selfed strains of corn as a hobby.

Progress report on the method of selection in self-fertilized lines: D. F. JONES. Selection in self-fertilized lines makes possible a control of the heredity from both the pollen parent and seed parent. Some seventy-five lines selected in this way and started from four different varieties chosen from among the best as grown in Connecticut have shown the usual segregation of type and reduction in vigor. Many clear-cut undesirable characters have appeared and are being eliminated. For example: fifteen lines have contained various forms of chlorophyll-deficient seedlings; ten, the "defective seed" factor; three, different forms of dwarf plants; two, golden plants; three, variegated plants; and five, various forms of sterility. Along with these outstanding weaknesses other marked variations in height, size of stalk, type of tassel and ear, and color of foliage have appeared. Such differences as these form the material for effective selection for productiveness.

Overcoming "root rot" by breeding: W. D. VALLEAU. In breeding for resistance to corn root rot, the fact should be kept in mind that disease-free seed probably does not exist, under average field conditions. All plants examined in the field as well as those grown in the sand box have been found to be infected. Differences in time of death of plants of a given variety under field conditions are dependent on differences in resistance of the plants to root rot, and are not the result of planting diseased or disease-free seed. Various seed treatments, including all of those commonly recommended for small grains, have failed as a means of control. Attempts to obtain disease-free seed by harvesting before ripening and protecting ears from further infection has failed as infection occurs before the milk stage. Ears may be graded according to resistance by growing seedlings in a sand box and noting the time required for the individual seedlings to rot to the surface of the sand. By this method premature death of plants has been reduced from an average of 36.1 in the checks to 8.4 per cent. in the plants from the most resistant ears. An attempt is being made to obtain pure lines of the most resistant strains by self-pollination. Self-pollination, even for many years, does not materially reduce the number of days between the death of the first and last plant from a given ear, over open-pollinated ears, in the sand box. Preliminary experiments indicate that field selection of seed from the longest-lived plants may prove a means of obtaining seed of a high degree of resistance.

Ear type selection and yield in corn: T. A. KIESSELBACH. From the seed standpoint, ear characteristics of dent corn fall into two classes, utilitarian and non-utilitarian. The utilitarian characters comprise those which indicate soundness and hereditary adaptation to certain environmental conditions. This adaptation can not be reliably forecasted by a mere ear examination. However, associated with marked differences in the plant growth habits resultant from corresponding regional differences in the environment (and especially climatic differences), are found rather distinct adaptive ear type characteristics. The more adverse plant growth conditions are for corn, the more nearly do the adapted types approach the small stalk, low leaf area, slender ear and smooth shallow kernel of flint corn. Approach of a balance or equilibrium between adverse environment and the plant and its ear type, is frequently spoken of as "running out" of the corn, whereas such a reaction is an actual betterment for the prevailing conditions. The corn grower is coming to recognize the advantage of modifying his conception of ear type to harmonize with the environment of his locality. There is no such thing as a universal best type.

Progress report on corn disease investigations: JAMES R. HOLBERT. Cooperative investigations by the Bureau of Plant Industry and certain agricultural experiment stations during the past three years have shown that the root, stalk and ear rot diseases of corn are widely distributed in this country wherever corn is grown. These diseases have been found to be a limiting factor in corn production. They may be largely controlled by careful field selection of healthy, productive plants, physical selection of seed ears, and the proper use of the germination test, as described in Farmer's Bulletin 1176. The continued selection of seed according to these recommendations has been effective in improving a number of varieties of corn. Other means for control, such as the breeding of resistant varieties, soil sanitation, and the use of certain soil correctives, are being investigated.

The present status of continuous selection experiments with corn: L. H. SMITH. Several lines

of continuous selection in corn for certain special characteristics, including both chemical and physical properties, have been carried on for many years at the Illinois Agricultural Experiment Station. Twenty-four generations of selection to influence the composition of the grain show very marked responses, and from a single original variety four diverse strains have been established, namely, high protein, low protein, high oil, and low oil. Similarly, high- and low-ear strains as well as erect- and declining-ear strains have been produced. Another example of this response to selection has been the development of a two-eared strain from an ordinary single-eared variety. In like manner differences in yield have been induced by similar methods of selection. These results all go to show something of the possibilities of profoundly modifying various characteristics by continuous selection in a cross-fertilized plant such as corn.

First generation corn varietal crosses: FRED GRIFFEE. A brief review is made of the development of the theory which accounts for the increased vigor of F_1 crosses. Experiments are reviewed in which F_1 corn crosses are compared with their parents for yield of grain. Of 146 crosses, 113 exceeded the parental average in yield of grain and 84 exceeded the better parent. At the Minnesota station 5 flint-dent crosses tested for a period of two to six years yielded an average of 7.7 per cent. more shelled corn per acre than either parent. Particular attention is called to the cross between Minnesota No. 13 and Squaw Flint which yielded 8.4 per cent. more shelled corn per acre than Minnesota No. 13, which is the higher yielding parent, and was a week to ten days earlier in maturity than Minnesota No. 13. Such a cross appears of considerable promise for sections where early maturity is an important factor. During the first three years of the study a strain of Minnesota No. 13 was used which had been selected for type for several years. In the latter years this strain was selected primarily for yield. The increase in yield of shelled corn per acre of the F_1 cross over the better parent has averaged less for the last two years than for the first four years of the tests in the case of crosses with Minnesota No. 13. On the basis of these results it appears that, if corn were selected primarily on the basis of yield, the value of F_1 varietal crosses would be somewhat questionable.

Rust and the weather: H. L. WALSTER. At Fargo, N. D., blue stem spring wheat averaged 7.1 bushels per acre in 5 seasons when rust epidemics occurred, and 26.7 bushels per acre in 5 non-rust seasons. The average minimal and maximal temperatures by 10-day periods from the date of seeding show the following differences as between the respective 5-year periods:

Average Differences in Degrees F. for Each 10-day Period after Seeding. Five-year Averages

			1st	2d	3d	4th	5th	6th	7th	8th	9th
Minimals of 5 Good Years	Minus	Minimals of 5 Rust Years	−1.76	+8.50	+6.72	+7.70	+2.84	+7.24	+8.32	+1.42	+2.94
Maximals of 5 Rust Years	Minus	Maximals of 5 Good Years	−1.54	+9.16	+4.96	+4.48	+0.28	+5.74	+5.72	+4.10	+0.72

During rust years maximal temperatures rose more rapidly and reached their highest point sooner than in non-rust years. The average rainfall during April, May, June and July averaged higher in rust years than in good years. When high rainfall occurred in good years danger of rust has been offset by low temperatures. When excessively high temperatures have occurred in good years, danger of rust has been offset by droughty conditions.

P. E. BROWN,
Secretary-Treasurer

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